Germany, or introduce new crops and new industries like the United States, or organise its workers like Hungary, the Board has one sufficient and final answer in the fact that such has never been the English theory of the function of a public office.

In the book before us we have an account of the policy of a man who took a different point of view, and created, perhaps, the most paternal ministry of agriculture in the world. Dr. Ignatius Darányi was Minister of Agriculture for seven years (1896–1903) in Hungary, and during his tenure of office he built up an extraordinary system of agricultural education, investigation, and organisation in Hungary. It would be impossible in the limits at our disposal to discuss either the means adopted or the results that have accrued; roughly speaking, Dr. Darányi's method in any industry was to make a start with a State-owned farm or garden, forest or mill, as the case might be. Here proceeded the investigations necessary to establish the conditions requisite for success, and from this centre issued the teachers who carried the new methods to the cultivators. The State then stepped in again, sometimes to lend the cultivator the money necessary for the fresh start, or to organise a co-operative society to enable him to realise the full advantage of the newer methods. Thus, by leaps and bounds, the whole character and quality of Hungarian agriculture has been changed. The reader will find the process set out fully with a wealth of statistical detail in Dr. Darányi's book, which takes the form of a kind of valedictory report on quitting office. It has been excellently translated by Mr. György, who, knowing so well the conditions prevailing in England, adds a preface discussing the value and limits of State interference in such matters. It is a wonderful record; to the English reader, particularly if he be a farmer, it seems difficult to believe that so much can be done for the industry, and also that the distance of a few hundred miles should render impossible in this country methods that have proved so practicable and so fruitful for the Hungarian agriculturist.

OUR BOOK SHELF.

The Treatment of Diseases of the Eye. By Dr. Victor Hanke. Translated by J. Herbert Parsons, F.R.C.S., and George Coats, M.D., F.R.C.S. Pp. vi+222. (London: Hodder and Stoughton, 1905.) Price 3*s.* 6*d.* net.

DR. VICTOR HANKE, the writer of this little book, is principal assistant to Prof. Fuchs in Vienna, and the methods of this famous clinique are those which are here given to a wider public. It naturally follows that it is characterised throughout by a practical sanity which has been sadly lacking in some books on similar subjects which have recently been thought worthy of translation. The author has no special hobby-horse on which to ride to mental destruction. His treatment throughout is practical, scientific in the best sense of the word, what we may call for lack of a more fitting adjective, commonsensical. There is no rash advocacy of new and untried methods of treatment simply because of their novelty. Consequently, it is a book which can be thoroughly recommended to all practitioners of the art of medicine. Reliance on it will not lead to disappointment, for the methods advocated are thoroughly modern and sound.

A careful reading reveals practically no ground for adverse criticism, and many points for active commendation. The warning against the indiscriminate use of cocaine is one that should be unnecessary to any practising ophthalmic surgeon, and yet we have only recently seen prescriptions for lotions and drops given to patients for frequent use containing cocaine. "The immoderate use of cocaine . . . is not only unnecessary but actually harmful to the corneal epithelium"; and again, "Cocaine should in general not be used, for on the one hand its action is only transitory, while on the other it has an injurious influence on the corneal epithelium; moreover the dilatation which follows the temporary contraction of the vessels is harmful."

It would be easy to point out many places in which good results can be obtained by methods of treatment other than those recommended, but as the book does not in any way pretend to be exhaustive, and as the methods given are thoroughly sound, it would be hypercritical to do so. We doubt, however, the advisability of the use of adrenalin in severe inflammatory glaucoma, even if only given to facilitate the operation. Macallan, in a paper in the Ophthalmic Hospital reports some two or three years ago, pointed out the dangers of this drug in glaucoma, and its tendency to set up the hæmorrhagic form.

The chapter on the various forms of inflammation of the cornea and their treatment is quite the most valuable in the book, and generally the earlier chapters dealing with the external diseases of the eye are fuller than the later chapters. The reason of this is that the author does not pretend to give descriptions of operations where only "considerable skill and experience can command success," and in diseases of the deeper parts of the eye the advice of the ophthalmic surgeon is more likely to be called for, and this book is not intended for him. In conclusion, we can only reiterate what we have already stated, that students of medicine will find this a thoroughly safe guide in the treatment of diseases of the eye.

Die Stellung Gassendis zu Deskartes. By Dr. Hermann Schneider. Pp. 67. (Leipzig: Dürr'sche Buchhandlung, 1904.) Price 1.50 marks.

GASSENDI AND DESCARTES were contemporaries and fellow-countrymen, but the relation between them is mainly one of contrast. Gassendi was of peasant origin, a writer encyclopædic in his range, an *Epicurus redivivus* with all Epicurus's distrust of mathematics and all his belief in a material soul, a sceptic who was yet content to remain in the ranks of the Catholic priesthood, his face ever turned to the past whether in philosophy or religion. On the other side there is Descartes, a noble by birth, a student principally of the human understanding, something of a Platonist, with the Platonist's reverence for mathematics and numbers, a dualist who fixed a great gulf between mind and body and between man and the lower animals, an uncompromising doubter of everything but his own doubt and all that is implied by the capacity to doubt, the exponent of *cogito, ergo sum*—in a word, the representative of the distinctively modern tendencies, which mean in religion Protestantism, in science mathematical physics, in philosophy Kantianism new and old. Only in so far as modern thought inclines to atomism and materialism—and how much that is the author points out in his closing paragraph—do we find that its sympathies lie with Gassendi rather than with Descartes.

These contrasts, extended into a detailed discussion of some of the writers' most important works and particularly of their views on psychology, physics, and

ethics, are well brought out by this author. His book may be heartily recommended to students of the period described.

A Text-book of Physics, Heat. By Prof. J. H. Poynting, Sc.D., F.R.S., and Prof. J. J. Thomson, M.A., F.R.S. Pp. xvi+354. (London: C. Griffin and Co., Ltd., 1904.) Price 15*s.*

THE third volume of this well known text-book more than sustains the standard set by its predecessors. The volumes on sound and properties of matter have already appeared. The volumes on light and on electricity and magnetism we hope may follow at a somewhat shorter interval than has intervened between the first three volumes of the series. It is hardly necessary to say that the work is well up to date, and extremely clear and exact throughout, and that it is as complete as it would be possible to make such a text-book within the limits which the authors have laid down for the scope of their work. Among the more original features which should be valuable to the student as filling gaps which are noticeable in similar text-books, we observe that a useful chapter is included on the subject of circulation and convection, with illustrations from meteorology and ventilation. The treatment of the important subject of radiation, especially in relation to temperature and thermodynamics, is unusually complete and clear, and presents in a simple, connected form a number of most important results which the student would have difficulty in finding elsewhere. The experimental spirit is maintained throughout the work in such a manner that the student will feel that he is learning from a practical master of the subject, and will unconsciously imbibe something of the attitude of mind of the original investigator. H. L. C.

The Oxford Atlas of the British Colonies. Part i. British Africa. Seventeen maps. (Oxford Geographical Institute: William Stanford and Co., Ltd., n.d.) Price 2*s.* 6*d.* net.

THE first thirteen plates consist of coloured maps, and the remaining four are outlines intended for use as "test" maps or for other class purposes. The first map shows a hemisphere in which Cape Colony occupies the centre, and it is possible from it to see at once the relation of South Africa to the other continents. Map ii. is a political map of the world drawn in accordance with Mollweides's equal area projection, and the student will notice at a glance the apparent distortion in shape, though the relative sizes of land areas in different parts of the map are correctly shown. In addition to meteorological charts, the atlas includes physical and political maps of Africa, and maps of Cape Colony, Natal and Zululand, the Transvaal and Orange River Colony, Rhodesia, and of West, East, and Central Africa.

High Temperature Measurements. By H. Le Chatelier and O. Boudouard. Authorised translation and additions by Dr. G. K. Burgess. Second edition. Pp. xv+341. (New York: John Wiley and Sons; London: Chapman and Hall, Ltd. 1904.) Price 12*s.* 6*d.* net.

IN preparing the present edition it was found necessary to make a large number of additions, and the book now gives a useful summary of what is known about pyrometry. The advances in optical pyrometry during the last few years are recognised by the authors, and a useful chapter on the laws of radiation has been inserted. A number of pyrometers are described, but the discussion of the principles involved is in general more adequate than the description of instruments. No mention is made of some of the best of these in use in this country.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

A Comparison between Two Theories of Radiation.

ON two occasions (NATURE, May 18 and July 13) Lord Rayleigh has asked for a critical comparison of two theories of radiation, the one developed by Prof. Planck (*Drude's Annalen*, i. p. 69, and iv. p. 553) and the other by myself, following the dynamical principles laid down by Maxwell and Lord Rayleigh. It is with the greatest hesitation that I venture to express my disagreement with some points in the work of so distinguished a physicist as Prof. Planck, but Lord Rayleigh's second demand for a comparison of the two methods leads me to offer the following remarks, which would not otherwise have been published, on the theory of Prof. Planck.

Early in his second paper, Planck introduces the conception of the "entropy of a single resonator" S. There are supposed to be N resonators having a total entropy $S_N = NS$, and S_N is supposed to be given by $S_N = k \log W + \text{constant}$, where W is the "probability" that the N resonators shall be as they are. Without discussing the legitimacy of assigning entropy to a single resonator, we may at present suppose S defined by $S = k/N \log W + \text{cons.}$

The function W, as at present defined, seems to me to have no meaning. Planck (in common, I know, with many other physicists) speaks of the "probability" of an event, without specifying the basis according to which the probability is measured. This conception of probability seems to me an inexact conception, and as such to have no place in mathematical analysis. For instance, a mathematician has no right, *quâ* mathematician, to speak of the probability that a tree shall be between six and seven feet in height unless he at the same time specifies from what trees the tree in question is to be selected, and how. If this is not so, may I ask, "What *is* the probability that a tree shall be between six and seven feet high?"

When Prof. Planck calculates the probability function W, he in effect assumes that *a priori* equal small ranges of energy are equally probable. Thus he tacitly introduces as the basis of his probability calculations an ensemble of systems of resonators such that the number of systems in which the energy of any given resonator lies between E and $E + dE$ is proportional simply to dE. This, of course, he has a right to do, only he must continue to measure probability according to this same basis.

The systems of resonators are in motion, their motion being governed by the laws of dynamics. Will they, as the motion progresses, retain the statistical property which has been the cause of their introduction, namely, that the number of systems in which the energy of any given resonator lies between E and $E + dE$ is proportional simply to dE? It is easily found, by the method explained in my "Dynamical Theory of Gases" (§ 211), that in general they will not; the probability function W is not simply a function of the coordinates of the system. Prof. Planck's position is as though he had attempted to calculate the probability that a tree should be between six and seven feet high, taking as his basis of calculation an enclosure of growing trees, and assuming the probability to be a function only of the quantities six and seven feet. His ensemble of systems has not yet reached a statistical "steady state."

Prof. Planck supposes his function S to possess the property of the entropy function, so that $1/T = dS/dU$, where T is the temperature. Combining this with Planck's calculation of S, we find

$$1/T = k/\epsilon \log (1 + \epsilon/U) \quad . \quad . \quad . \quad . \quad (1)$$

Here ϵ is a small quantity, a sort of indivisible atom of energy, introduced to simplify the calculations. We may legitimately remove this artificial quantity by passing to the limit in which $\epsilon = 0$. In this way we obtain

$$1/T = k/U \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (2)$$

Thus the mean energy of each resonator, according to this equation, is the same multiple of the temperature, no